

One hour and less—Continued.

Station and state.	Amount.	Time.	Date.
	<i>Inches.</i>	<i>h. m.</i>	
Jupiter, Fla.	0.30	0 05	14, 1892
New York, N. Y.	0.30	0 05	25, 1891
Buffalo, N. Y.	0.30	0 05	25, 1893
Washington, D. C.	0.30	0 05	1, 1890
Norfolk, Va.	0.30	0 05	25, 1891
Galveston, Tex.	0.29	0 05	25, 1893
Eastport, Me.	0.27	0 05	5, 1892
Indianapolis, Ind.	0.25	0 05	19, 1892
Baltimore, Md.	0.25	0 05	29, 1893
Jacksonville, Fla.	0.25	0 05	6, 1893
Do.	0.25	0 05	9, 1893
Wilmington, N. C.	0.25	0 05	30, 1892
Jupiter, Fla.	0.25	0 10	21, 1893
Boston, Mass.	0.80	0 10	12, 1892
Jacksonville, Fla.	0.80	0 10	31, 1892
Tampa, Fla.	0.80	0 10	9, 1892
Omaha, Nebr.	0.80	0 10	14, 1893
Galveston, Tex.	0.75	0 10	4, 1890
Boston, Mass.	0.70	0 10	6, 1893
Saint Paul, Minn.	0.70	0 10	23, 1893
Atlanta, Ga.	0.65	0 10	1, 1892
Dodge City, Kans.	0.60	0 10	9, 1892
Key West, Fla.	0.60	0 10	30, 1891
New York, N. Y.	0.59	0 10	4, 1888
Savannah, Ga.	0.56	0 10	14, 1893
Norfolk, Va.	0.57	0 10	31, 1892
Bismarck, N. Dak.	0.56	0 10	27, 1892
Cleveland, Ohio.	0.56	0 10	19, 1892
Saint Louis, Mo.	0.51	0 10	7, 1892
Jupiter, Fla.	0.50	0 10	14, 1892
New York, N. Y.	0.50	0 10	19, 1893
Salisbury, N. C.	0.50	0 10	13, 1888
Franklin Furnace, N. J.	0.99	0 15	19, 1893
Charleston, S. C.	1.47	0 18	9, 1890
Lead Hill, Ark.	1.00	0 18	2, 1882
Jupiter, Fla.	2.12	0 20	21, 1893
Trenton, S. C.	1.42	0 20	18, 1893
Brooksville, Fla.	1.40	0 20	1, 1893
Escanaba, Mich.	1.27	0 20	11, 1877
Marksville, La.	1.25	0 20	27, 1892
Albany, N. Y.	1.20	0 20	2, 1878
Fox Creek, Mo.	1.15	0 20	25, 1893
Glenville, W. Va.	1.14	0 20	12, 1892
Nashville, Tenn.	1.10	0 20	17, 1891
Emporium, Pa.	1.05	0 20	5, 1890
Parkersburg, W. Va.	1.01	0 20	1, 1890
Mossing Ford, Va.	1.00	0 20	2, 1890
Abilene, Tex.	1.00	0 20	29, 1892
Louisville, Ky.	1.26	0 23	20, 1878
Hardin, Colo.	1.52	0 24	13, 1890
Galveston, Tex.	1.55	0 25	17, 1871
Ithaca, N. Y.	1.47	0 25	4, 1892
Colorado Springs, Colo.	2.75	0 30	14, 1890
Mesquite, Tex.	2.50	0 30	10, 1875
Jupiter, Fla.	2.35	0 30	20, 1893
Stella, Tex.	2.05	0 30	4, 1893
Lebo, Kans.	2.01	0 30	22, 1892
Somersville, N. J.	2.00	0 30	19, 1893
Wellsboro, Pa.	1.95	0 30	21, 1885
Montevideo, Minn.	1.95	0 30	19, 1893
Vevay, Ind.	1.90	0 30	13, 1879
Grantsburg, Wis.	1.88	0 30	7, 1889
Manistee, Mich.	1.67	0 30	8, 1892
Emilie, La.	1.62	0 30	7, 1893
Queensbury, N. Y.	1.56	0 30	14, 1890
Mount Auburn, Ohio.	1.52	0 30	26, 1880
Providence, R. I.	3.50	0 35	6, 1878
Auburn, N. H.	3.00	0 35	27, 1877
Hulmeville, Pa.	2.20	0 35	25, 1880

One hour and less—Continued.

Station and state.	Amount.	Time.	Date.
	<i>Inches.</i>	<i>h. m.</i>	
Pittsburg, Pa.	1.85	0 35	16, 1884
Cincinnati, Ohio.	1.85	0 35	27, 1882
Silver Falls, Tex.	1.82	0 35	20, 1893
Quitman, Ga.	2.30	0 40	30, 1893
Sharon Springs, Kans.	2.00	0 40	20, 1892
Jacksonville, Fla.	3.72	0 41	20, 1873
Philo, Ill.	2.63	0 45	5, 1892
Hudson, Wis.	2.50	0 45	11, 1891
Detroit, Mich.	2.48	0 45	31, 1878
Sandusky, Ohio.	0.25	0 45	24, 1892
Charlotte, N. C.	2.01	0 45	3, 1890
Weldon, N. C.	3.43	0 50	22, 1892
Fort Union, N. Mex.	2.34	0 50	12, 1883
Bushnell, Ill.	4.02	1 00	5, 1893
Princeton, Mo.	4.00	1 05	15, 1891
Campo, Cal.	11.50	1 20	12, 1891
Plover, Wis.	4.50	1 30	3, 1890

† Record incomplete.

HAIL.

Description of the more severe hailstorms reported for the month is given under "Local storms."

Hail was reported as follows: 1st, Colorado, Florida, and Texas. 3d, Ohio. 4th, Arizona, Colorado, Ohio, Pennsylvania, and Wisconsin. 5th, Colorado, Illinois, Maryland, Missouri, and Nebraska. 6th, Colorado, Maryland, Massachusetts, New Hampshire, New Jersey, Pennsylvania, and Tennessee. 7th, Massachusetts, New Hampshire, Texas, and Utah. 8th, Colorado, Iowa, Minnesota, Mississippi, New Mexico, Texas, and Wisconsin. 9th, Colorado, North Dakota, and South Dakota. 10th, Colorado, Iowa, Kansas, Missouri, Texas, and Wisconsin. 11th, Arkansas and Nevada. 12th, South Dakota and Utah. 13th, Arizona and Idaho. 14th, Colorado and Nebraska.

15th, Colorado. 16th, Colorado, Minnesota, Oregon, and Utah. 17th, Kansas, Minnesota, Nebraska, Pennsylvania, and Wisconsin. 18th, Colorado and Michigan. 19th, Colorado, Idaho, Kansas, Michigan, Minnesota, Nebraska, New Jersey, Pennsylvania, and South Dakota. 20th, Minnesota. 21st, Colorado, Iowa, Minnesota, New Mexico, and Texas. 23d, Colorado, Minnesota, and South Dakota. 24th, Connecticut, Michigan, Minnesota, and Wisconsin. 25th, Colorado, Kentucky, Missouri, New York, and Tennessee. 26th, Minnesota, Nebraska, and South Dakota. 27th, Michigan, Minnesota, Nebraska, New York, and Vermont. 28th, Colorado and South Dakota. 29th, California, Colorado, Iowa, Massachusetts, and New Mexico. 30th, Colorado and New Mexico. 31st, Idaho and Utah.

WINDS.

The prevailing winds in August, 1893, are shown on Chart II by arrows flying with the wind. In New England and on the northeast slope of the Rocky Mountains the winds were generally from southwest to northwest; in the middle and south Atlantic states and the Ohio Valley and Tennessee, northeast; in the Florida Peninsula, southeast to southwest; in the west Gulf states, the Missouri Valley, and on the southeast slope of the Rocky Mountains, southeast to south; on the Pacific coast, west to northwest; in the Lake region, the extreme northwest, and the upper Mississippi valley, variable.

HIGH WINDS.
(In miles per hour.)

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows:

10th, 63, sw., at Des Moines, Iowa; 56, s., at Kearney, Nebr.

12th, 59, w., at Pikes Peak, Colo. 14th, 52, w., at Fort Buford, N. Dak.; 52, s., at Amarillo, Tex. 18th, 50, se., at Huron, S. Dak. 21st, 72, ne., at Block Island, R. I.; 60, n., at Woods Holl, Mass.; 52, ne., at Nantucket, Mass. 23d, 70, ne., at Kittyhawk, N. C.; 60, n., at Hatteras, N. C.; 52, ne., at Atlantic City, N. J.; 50, nw., at Sioux City, Iowa. 24th, 55, ne., at Philadelphia, Pa.; 54, s., at New London, Conn.; 52, e., at Woods Holl, Mass. 27th, 88, e., at Charleston, S. C.; 72, ne., at Savannah, Ga.; 55, w., at Titusville, Fla.; 53, s., at Southport, N. C. 28th, 96, e., at Charleston, S. C.; 72, s., at Southport, N. C.; 52, ne., at Augusta, Ga.; 50, ne., at Chicago, Ill.; 50, s., at Kittyhawk, N. C.; 50, sw., at Savannah, Ga. 29th, 59, s., at Woods Holl, Mass.; 57, s., at New Haven, Conn.; 57, se., at New London, Conn.; 54, se., at New York, N. Y.; 51, n., at Oswego, N. Y.; 50, s., at Kittyhawk, N. C. 31st, 55, e., at Tatoosh Island, Wash.

LOCAL STORMS.

(75th meridian time is used at regular Weather Bureau stations.)

1st.—A severe thunder, rain, and wind storm passed over Dinwiddie County, Va., in the evening; one man was killed and another stunned by lightning. A heavy cloudburst occurred in the vicinity of White Oaks, N. Mex. The main force of the storm passed one or two miles east of the town; a house and a number of corrals were destroyed and other damage done. The Bonita River overflowed its banks and roads were rendered impassable.

2d.—A severe rainstorm occurred at Bisbee, Ariz., in the evening; one building was swept away and several houses were flooded.

3d.—A heavy rain and thunderstorm at Lookout Mountain, Tenn., delayed railroad traffic, and minor damage was done by lightning.

4th.—Thunder and rain storms occurred in Pennsylvania, Virginia, Ohio, and Indiana. At Pittsburg, Pa., a thunder and rain storm occurred in the early morning; small creeks were flooded. A house near Emsworth, Pa., was struck by lightning, and hail was reported to have fallen at Moon, Pa. At Coraopolis, Pa., a severe thunderstorm occurred in the afternoon; an oil tank was set on fire, and damage was done to electric wires. A cloudburst was reported at Petersburg, Va., at 11.30 a. m.; much damage was done by flood. The Appomattox River rose 6 feet in one hour and a half. The rain in the adjoining counties was very heavy, and much damage was done to crops and bridges. Destructive thunderstorms occurred in southwestern Ohio; at Oxford, Ohio, the storm was attended by heavy hail, beating down corn and killing poultry. A severe thunderstorm, with heavy rain, visited Sharptown, Ind., in the early morning, doing great damage to crops and property.

5th.—Severe hailstorms were reported in Michigan and Missouri and heavy rain fell in Texas and Arizona. In Gratiot County, Mich., great damage was done to crops by hail, and several buildings were struck by lightning. Adair County, Mo., was visited by a severe hailstorm, with thunder and lightning, in the afternoon. Crops, gardens, and roofs were greatly damaged by the hail, and cattle and horses were killed by lightning. At El Paso, Tex., damage was done by flood. Heavy rain washed out railroads east and west of Tucson, Ariz., and railroad traffic was delayed.

6th.—Severe thunderstorms occurred in the New England and middle Atlantic states and Florida. Much damage was done in Boston, Mass., and vicinity. In Lynn, Mass., the damage was estimated at nearly \$100,000. A sudden and severe storm of wind and rain broke over Philadelphia, Pa., at 4.25 p. m. The temperature fell from 90° to 61°; for 30 minutes the wind blew in violent gusts, attaining an extreme velocity of 60 miles per hour. Much damage was done in the north part of the city, and on the river small boats were capsized. At Le Roy, Chanceford, and Hopewell, Pa., the storm was attended by hail, and considerable damage was done to corn, buckwheat, and tobacco. During a thunderstorm at Jacksonville, Fla., in the evening, a barn was struck by lightning.

7th.—Thunderstorms continued over New England. At Hanover, N. H., 4 barns were struck by lightning. A severe hailstorm, with heavy thunder and lightning, visited Keene, N. H., about 7 a. m., and considerable damage was done to crops.

8th.—Thunderstorms were reported in New York, Florida, Colorado, and New Mexico. At Pueblo, Colo., a thunder and rain storm occurred in the evening. Heavy rain washed out railroads; estimated damage, \$25,000. At Fort Stanton, N. Mex., a thunderstorm occurred in the evening and hail fell for 3 minutes. A tremendous cloudburst occurred west of the station, and much damage was done by washouts and to bridges. The Rio Bonita overflowed its banks.

10th.—Damage was done by a heavy rain and hail storm at Paducah, Ky. Heavy rain fell in parts of Iowa. At Des Moines a thunderstorm began shortly after 1 p. m. and continued until 6.05 p. m. The wind reached a maximum velocity of 60 miles per hour. During a thunderstorm at Kansas City, Mo., in the afternoon a house was struck by lightning. A violent storm occurred about 6 miles south of Larned, Kans., between 4 and 5 p. m. Nine funnel-shaped clouds were observed within a distance of 9 miles. Two clouds, one moving northeast and the other south, met, both having a whirling motion in opposite directions. Damage, \$1,000. At Bucklin, Kans., about 50 miles southwest of Larned, two distinct tornadoes formed north and east of that place; not much damage done. During a thunderstorm, with hail, at McCoy, Colo., damage was done to vegetation.

12th.—Severe thunderstorms prevailed in New Hampshire, Massachusetts, and Kansas, and a severe local storm occurred in Pennsylvania. At New Brunswick, N. J., a heavy thunderstorm began at 2.27 and ended at 6 p. m.; heavy rain fell, and the temperature dropped from 95° to 71°. A sudden squall, lasting 3 minutes, did some damage to corn. Nanticoke, Pa., was visited by a local storm in the afternoon. The path of the storm was about 1½ mile long and 1 mile wide; it moved in a northwest direction, spending its force along the Susquehanna River. Heavy rain fell after the storm. A house was struck by lightning and 2 persons in the house were killed; the house was lifted from its foundation and carried 50 yards. Six other houses were badly wrecked and the inmates more or less injured. Hundreds of trees were torn up by the roots. At Winona, Kans., a thunderstorm moved northeast, with light rain and small hail, at 2 p. m.; 2 children were killed, and damage was done to property. During a severe thunderstorm 12 miles southeast of Rushville, Kans., a man and 2 horses were killed and 2 persons were stunned by lightning.

13th.—At Vineyard Haven, Mass., a house was struck by lightning and damaged to the extent of \$500. Heavy rainstorms prevailed in Arizona. At Farleys Camp, Ariz., a very heavy rainstorm began at 5 p. m. and continued until 11.30 p. m.; some damage was done to roads, vegetation, and grain. At Crittendon and Florence, Ariz., the storm was attended by terrific thunder, rain, hail, and gusts of wind. At Holbrook, Ariz., 1.40 inches of rain fell in 45 minutes.

14th.—At Selma, S. C., a heavy wind and rain storm destroyed crops on lowlands. At Erie, Pa., the wind reached a velocity of 25 miles per hour; on Lake Erie the gale was more severe and boats were compelled to return to port. Severe thunderstorms prevailed in Nebraska. At Omaha, Nebr., a severe thunder and rain storm occurred in the afternoon. The wind reached a maximum velocity of 34 miles per hour; streets were flooded. During a heavy thunderstorm at Mapleton, Nebr., a house was struck by lightning; loss \$2,500. A very destructive hailstorm occurred in the northwestern part of Kansas. Great damage was done to crops and cattle were killed by the heavy hail.

15th.—A tornado occurred in southeastern Nebraska. The storm struck Pawnee City, Nebr., at 4.30 p. m.; moved northeast; a funnel-shaped cloud with a whirling motion from left to right was observed. A number of persons were injured, and the damage to property was placed at \$4,000. The storm passed just south of Table Rock, where houses were demolished and 1 person was badly injured. Six miles north of Humboldt everything in the storm's path was destroyed, and several persons were injured. At Beatrice, Nebr., heavy rain fell for 24 hours; great damage was done to bridges and railroads. Heavy rain in northeastern Kansas washed out railroads; all small streams overflowed their banks and great damage was done to property. During a heavy thunderstorm at First View, Colo., a house was struck by lightning.

16th.—Hail destroyed gardens and broke glass about Bird Island, Minn.

17th.—During a thunderstorm at Arkadelphia, Ark., in the evening, a man was killed by lightning. Hail destroyed crops in central Minnesota. An exceptionally severe rain and thunder storm visited the country about Syracuse, Kans. The storm was attended by a heavy downpour of rain, incessant lightning, and high wind. The town of Syracuse was flooded; stock was drowned, and great damage was done to property.

18th.—Some damage was done at Seibert, Colo., by hail.

19th.—Thunderstorms occurred in New Jersey and destructive hailstorms in Minnesota. At Somerville, N. J., a thunderstorm, with hail, occurred in the afternoon; damage was done to property and crops. In western and southwestern Minnesota damage was done to crops and property by hail. At Dodge City, Kans., a thunderstorm began at 2.20 and ended at 6.18 p. m., with heavy rain from 3.05 to 5.10 p. m.; 2 miles west of Dodge City railroads were washed out. An unusually severe thunderstorm struck Denison, Tex., about 5.30 p. m.; several persons were struck by lightning and damage was done to property. At Santa Fe, N. Mex., a thunderstorm began at 8.23 and continued until 10.40 p. m.

20th.—A violent electric storm passed over Waco, Tex., in the morning; a man was struck by lightning and damage was done to buildings. During a thunderstorm at Pueblo, Colo., in the evening, minor damage was done by lightning.

21st.—A severe thunderstorm occurred 4 miles west of Ellendale, N. Dak.; a man was killed by lightning.

23d.—A heavy thunder and rain storm occurred at Minneapolis, Minn., in the evening. At Bird Island, Minn., a hailstorm destroyed gardens and broke glass. At Sioux City, Iowa, a heavy rain and thunder storm began at 5.30 p. m.; a house was struck by lightning, and damage to property by flood was estimated at \$40,000. During a thunderstorm at Hutchinson, Kans., a horse was killed by lightning.

24th.—At Valparaiso, Ind., a barn was struck by lightning and burned, together with 5 horses and 2 cows. A heavy thunderstorm, with high wind and some hail, passed north-

west of Waukesha, Wis.; 2 barns were struck by lightning and damage was done to corn and grain. At Minneapolis, Minn., a thunder and rain storm began at 8.30 a. m. and ended at 11.48 a. m.; hail fell for 10 minutes. A second storm began at 12.25 and ended at 3.12 p. m.; 4.08 inches of rain fell in the two storms. A house was struck by lightning and damage was done by flood. During a heavy thunderstorm at Red Wing, Minn., in the early morning, the wind reached a maximum velocity of 32 miles per hour. A house was struck by lightning.

26th.—A heavy thunder and rain storm occurred 10 miles south of Bowling Green, Ky., accompanied by high wind and hail. Damage was done to corn and tobacco.

27th.—Five miles north of Lebanon Springs, N. Y., a barn was struck by lightning and burned. During a heavy thunderstorm at New Lisbon, N. Y., several barns were struck by lightning. A violent electric storm visited Rome, N. Y., about 3 p. m.; rain fell in torrents, accompanied by heavy hail. Damage was done to property. In Lewis County, N. Y., several buildings were struck by lightning. A destructive gale passed over Kiowa, Kans., in the early morning. Brick buildings and heavy plate glass windows had the appearance of being struck by grapeshot. At one place the clouds appeared to dip, and outhouses, small buildings, etc., were picked up and scattered in all directions. A heavy storm at Sterling, Kans., prostrated crops.

28th.—During a heavy thunderstorm at Bear Valley, S. Dak., a house was struck by lightning and a child killed. A cloudburst in the mountains in northwestern Arizona caused considerable damage by flood.

29th.—A horse was killed by lightning near Wellington, Nev.

31st.—During a thunderstorm at Petersham, Mass., 3 children were killed by lightning. At Chattanooga, Tenn., a heavy thunder and rain storm began in the evening and continued until midnight. In the northeast suburbs the rain was very heavy and damage was done to railroads. Considerable damage was done at Salt Lake City, Utah, by a severe windstorm.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, August, 1893.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Shreveport, La.	29.2	5.0	1	0.9	16	4.1
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0					
Little Rock, Ark.	23.0	7.9	19	4.6	6	3.3
<i>Missouri River.</i>						
Fort Buford, N. Dak.	25.0	10.5	1	7.2	31	3.3
Bismarck, N. Dak.	75.0	5.1	1	2.6	30, 31	2.5
Pierre, S. Dak.	13.0					
Sioux City, Iowa	18.7	9.5	1-4	7.0	31	2.5
Omaha, Nebr.	18.0	8.9	1	7.1	31	1.8
Kansas City, Mo.	21.0	13.2	19	7.8	31	5.4
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	2.6	31	1.8	11	0.8
La Crosse, Wis.	70.0	2.9	1	1.9	24, 25, 28-31	1.0
Dubuque, Iowa	16.0	3.4	1	1.7	30, 31	1.7
Davenport, Iowa	15.0	2.4	1, 2	0.9	30, 31	1.5
Keokuk, Iowa	14.0	2.6	1	0.8	30, 31	1.8
Hannibal, Mo.	17.0	3.4	1	1.5	30, 31	1.9
Saint Louis, Mo.	30.0	11.3	3	5.7	31	5.6
Cairo, Ill.	40.0	11.3	5	6.0	31	5.3
Memphis, Tenn.	33.0	8.5	1	4.5	24, 25	4.1
Vicksburg, Miss.	41.0	14.3	1	4.2	29	10.1
New Orleans, La.	13.0	7.2	1	3.4	30, 31	3.8

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Ohio River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Parkersburg, W. Va.	38.0					
Cincinnati, Ohio	45.0	6.0	10, 11	3.6	29, 30	2.4
Louisville, Ky.	24.0	3.6	1	2.3	29-31	1.3
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	8.4	4	1.2	27	7.2
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	5.2	18	1.6	28, 29, 31	3.6
Knoxville, Tenn.	29.0					
<i>Monongahela River.</i>						
Pittsburg, Pa.	22.0	6.5	29	5.3	6, 7, 30	1.2
<i>Savannah River.</i>						
Augusta, Ga.	32.6	12.9	29	5.0	26	7.9
<i>Willamette River.</i>						
Portland, Oregon	15.0	12.7	1	5.1	31	7.6
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	3.1	31	0.3	16-19, 25	2.8
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	14.1	16	0.8	31	13.3
<i>James River.</i>						
Lynchburg, Va.	18.0	11.3	29	0.0	10-13, 16-19, 22, 27, 28	11.3
<i>Sacramento River.</i>						
Red Bluff, Cal.	22.0	1.6	1	1.3	17-31	0.3
Sacramento, Cal.	25.0	12.0	1	9.0	31	3.0
<i>Des Moines River.</i>						
Des Moines, Iowa	19.0					